Cornell and Seoul researchers report new anti-cancer mechanism of vitamin C

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By Linda McCandless

GENEVA, N.Y. - A team of scientists from Cornell University, working at the New York State Agricultural Experiment Station, and from Seoul National University, South Korea, report a new mechanism by which vitamin C fights cancer. Their findings appear in the January 12 issue of *The Lancet*, the international journal for physicians published in London.

C.Y. Lee
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C.Y. Lee, Cornell professor of food science and technology, and his South Korean colleagues, Ki Won Lee, Hyong Joo Lee and Kyung-Sun Kang, found that vitamin C blocks the carcinogenic effects of hydrogen peroxide on intercellular communication. Until this finding, the mechanism for vitamin C's inhibitory effects on carcinogenic tumor promotion was not understood.

"Vitamin C has been considered one of the most important essential nutrients in our diet since the discovery in 1907 that it prevents scurvy," says Lee. "In addition, vitamin C has several important functions in our body for the synthesis of amino acids and collagen, wound healing, metabolism of iron, lipids and cholesterol and others. In particular, vitamin C is a well known anti-oxidant that scavenges free radicals." (An anti-oxidant is one of many chemicals that reduce or prevent oxidation, thus preventing cell and tissue damage from free radicals in the body.)

"Vitamin C prevents the inhibition of gap-junction intercellular communication (GJIC) induced by hydrogen peroxide," says Lee. GJIC is essential for maintaining normal cell growth. Inhibition of GJIC is strongly related to the carcinogenic process, especially to tumor promotion. Hydrogen peroxide, a tumor promoter, inhibits GJIC by changing a special protein, connexin43. When rat liver epithelial cells were treated with vitamin C, the researchers report, inhibition of GJIC induced by hydrogen peroxide was prevented.

Lee and his coworkers believe that the vitamin's anti-tumor action functions through a different mechanism. The report adds that quercetin, a phytochemical found in apples, has even stronger anticancer activity than vitamin C. (Phytochemicals, such as flavanoids and polyphenols, are plant chemicals that contain protective, disease-preventing compounds.)

"The most powerful weapon we have in the fight against cancer is prevention," concludes Lee. "A diet rich in phytochemicals and vitamin C will reduce the risk of cancer. These phytochemicals and nutrients are most readily available in fresh fruits and vegetables." These recommendations echo those of Lee and his Cornell colleagues in a report in the journal *Nature* (June 22, 2000).

In *The Lancet* article, the researchers suggest that "inhibiting tumor promotion" (a reversible and long-term process) may be a more practical strategy in preventing cancer than "preventing tumor initiation" (an irreversible and short-term process).

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